

WHAT IS CLAIMED IS:

1. A processing system for processing a plate shaped sample, comprising:

a conveyor mechanism having a holding portion for
5 substantially horizontally holding a plate shaped sample,
said conveyor mechanism conveying the sample held by said
holding portion; and

a plurality of processing apparatuses disposed at
equidistant positions separated from a driving shaft of
10 said conveyor mechanism,

wherein said conveyor mechanism pivots said holding
portion about the driving shaft substantially in a
horizontal plane and moves said holding portion close to
or away from the driving shaft to convey the plate shaped
15 sample among said plurality of processing apparatuses while
receiving/transferring the plate shaped sample from/to
each of said plurality of processing apparatuses in
substantially horizontal state, and

said plurality of processing apparatuses include:

20 a separating apparatus for separating the plate
shaped sample while substantially horizontally holding the
plate shaped sample; and

an inverting apparatus for pivoting an upper plate
shaped sample of two plate shaped samples obtained by
25 separation by said separating apparatus through 180°.

2. The system according to claim 1, wherein the plate
shaped sample has a separation layer, and said separating

apparatus separates the plate shaped sample at the separation layer.

3. The system according to claim 2, wherein said separating apparatus ejects a stream of a fluid toward the
5 separation layer to separate the plate shaped sample at the separation layer.

4. The system according to claim 2, wherein said separating apparatus ejects a stream of a fluid toward the separation layer while rotating the plate shaped sample
10 substantially in a horizontal plane to separate the plate shaped sample at the separation layer.

5. The system according to claim 1, wherein said separating apparatus comprises a Bernoulli chuck as a holding mechanism for holding the plate shaped sample.

15 6. The system according to claim 2, wherein said separating apparatus applies pressure of a fluid substantially standing still to at least part of the separation layer to separate the plate shaped sample at the separation layer.

20 7. The system according to claim 2, wherein said separating apparatus has a closed vessel, stores the plate shaped sample in the closed vessel, and sets internal pressure of the closed vessel at high pressure to separate the plate shaped sample at the separation layer.

25 8. The system according to claim 1, wherein said plurality of processing apparatuses include a centering apparatus for centering the plate shaped sample before the

plate shaped sample is transferred to said separating apparatus.

9. The system according to claim 1, wherein said plurality of processing apparatuses include a cleaning
5 apparatus for cleaning portions of a plate shaped sample obtained by separation by said separating apparatus.

10. The system according to claim 9, wherein said cleaning apparatus cleans the plate shaped sample obtained by separation by said separating apparatus in the
10 horizontal state.

11. The system according to claim 2, wherein said plurality of processing apparatuses include a cleaning/drying apparatus for cleaning and drying a plate shaped sample obtained by separation by said separating
15 apparatus.

12. The system according to claim 11, wherein said cleaning/drying apparatus cleans and dries the plate shaped sample obtained by separation by said separating apparatus in the horizontal state.

20 13. The system according to claim 2, wherein processing operations by said plurality of processing apparatuses are parallelly executed.

14. The system according to claim 1, wherein said conveyor mechanism comprises a scalar robot.

25 15. The system according to claim 1, wherein the plate shaped sample is a semiconductor substrate.

16. The system according to claim 1, wherein the plate

shaped sample is formed by bonding a first substrate and a second substrate and has a layer having a fragile structure as a separation layer.

17. A processing system for processing a plate shaped sample, comprising:

a plurality of processing apparatuses for handling or processing the plate shaped sample; and

a conveyor mechanism having a holding portion for substantially horizontally holding the plate shaped sample, said conveyor mechanism linearly moving said holding portion in a horizontal plane, pivoting said holding portion about a pivot shaft, and moving said holding portion close to or away from the pivot shaft to convey the plate shaped sample among said plurality of processing apparatuses while transferring/receiving the plate shaped sample to/from each of said plurality of processing apparatuses in a substantially horizontal state,

wherein said plurality of processing apparatuses are disposed at positions where said conveyor mechanism can transfer the plate shaped sample and said plurality of processing apparatuses include:

a separating apparatus for separating the plate shaped sample while substantially horizontally holding the plate shaped sample, and

an inverting apparatus for pivoting an upper plate shaped sample of two plate shaped samples obtained by separation by said separating apparatus through 180°.

18. The system according to claim 17, wherein said plurality of processing apparatuses are disposed at substantially equidistant positions separated from a movable range of the pivot shaft.
- 5 19. The system according to claim 17, wherein said conveyor mechanism has a horizontal driving shaft and moves said holding portion along the horizontal driving shaft.
20. The system according to claim 19, wherein some processing apparatuses of said plurality of processing
10 apparatuses are disposed on one side of the horizontal driving shaft on a line substantially parallel to the horizontal driving shaft.
21. The system according to claim 20, wherein remaining processing apparatuses of said plurality of processing
15 apparatuses are disposed on the other side of the horizontal driving shaft on a line substantially parallel to the horizontal driving shaft.
22. The system according to claim 21, wherein some processing apparatuses of said remaining processing
20 apparatuses of said plurality of processing apparatuses are disposed at positions separated from one end and/or the other end of the horizontal driving shaft by a predetermined distance.
23. The system according to claim 21, wherein said
25 processing apparatuses disposed on one side of the horizontal driving shaft comprise a processing apparatus
for manipulating the plate shaped sample or physically or
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chemically processing the plate shaped sample, and said processing apparatuses disposed on the other side of the horizontal driving shaft comprise a loader or unloader for handling the plate shaped sample.

5 24. The system according to claim 22, wherein said processing apparatuses disposed on one side of the horizontal driving shaft and processing apparatuses disposed at one end and/or the other end of the horizontal driving shaft comprise processing apparatuses for
10 manipulating the plate shaped sample or physically or chemically processing the plate shaped sample, and said processing apparatuses disposed on the other side of the horizontal driving shaft comprise loaders or unloaders for handling the plate shaped sample.

15 25. The system according to claim 17, wherein the plate shaped sample has a separation layer, and said separating apparatus separates the plate shaped sample at the separation layer.

20 26. The system according to claim 25, wherein said separating apparatus ejects a stream of a fluid to the separation layer to separate the plate shaped sample at the separation layer.

27. The system according to claim 25, wherein said separating apparatus ejects a stream of a fluid to the
25 separation layer while rotating the plate shaped sample to separate the plate shaped sample at the separation layer.

28. The system according to claim 17, wherein said

separating apparatus has a Bernoulli chuck as a holding mechanism for holding the plate shaped sample.

29. The system according to claim 25, wherein said separating apparatus applies pressure of a fluid which is
5 substantially standing still to at least part of the separation layer of the plate shaped sample to separate the plate shaped sample at the separation layer.

30. The system according to claim 25, wherein said separating apparatus has a closed vessel, the plate shaped
10 sample is stored in the closed vessel, and pressure in the closed vessel is increased to separate the plate shaped sample at the separation layer.

31. The system according to claim 17, wherein said plurality of processing apparatuses include a centering
15 apparatus for centering the plate shaped sample before the plate shaped sample is transferred to said separating apparatus.

32. The system according to claim 17, wherein said plurality of processing apparatuses include a cleaning
20 apparatus for cleaning a plate shaped sample obtained by separation by said separating apparatus.

33. The system according to claim 32, wherein said cleaning apparatus cleans the plate shaped sample obtained
25 by separation by said separating apparatus in a horizontal state.

34. The system according to claim 17, wherein said plurality of processing apparatuses include a

cleaning/drying apparatus for cleaning and drying the plate shaped sample obtained by separation by said separating apparatus.

35. The system according to claim 34, wherein said
5 cleaning/drying apparatus cleans and dries the plate shaped sample obtained by separation by said separating apparatus in a horizontal state.

36. The system according to claim 17, wherein said plurality of processing apparatuses parallelly execute
10 processing.

37. The system according to claim 17, wherein said conveyor mechanism comprises a scalar robot and a driving mechanism for linearly driving said scalar robot in the horizontal plane.

15 38. The system according to claim 17, wherein the plate shaped sample is a semiconductor substrate.

39. The system according to claim 17, wherein the plate shaped sample is formed by bonding a first substrate and a second substrate and has a layer having a fragile
20 structure as a separation layer.

40. A processing system for processing a plate shaped sample, comprising:

a plurality of processing apparatuses for handling or processing the plate shaped sample; and

25 a conveyor mechanism having a holding portion for substantially horizontally holding the plate shaped sample,
said conveyor mechanism moving said holding portion to

conveyor the plate shaped sample among said plurality of processing apparatuses while transferring/receiving the plate shaped sample to/from each of said plurality of processing apparatuses in a substantially horizontal state,

wherein said plurality of processing apparatuses are disposed at positions where said conveyor mechanism can transfer the plate shaped sample and said plurality of processing apparatuses include:

10 a separating apparatus for separating the plate shaped sample while substantially horizontally holding the plate shaped sample, and

an inverting apparatus for pivoting an upper plate shaped sample of two plate shaped samples obtained by separation by said separating apparatus through 180° .